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# ENVIRONMENTAL ISSUES IN BUCHAREST METROPOLITAN AREA

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Abstract: The development of metropolitan areas represents the main feature of today's urban evolution trends. Romania started to adopt the concept of metropolitan area from scientific point of view in the 1990s and from political point of view in the 2000s. With the fall of the communist regime in the year 1989, Romania experienced radical changes in all fields of activity. A first branch to be seriously affected by the restructuring process was *agriculture*. The major changes in land use during the transition period from a centralised economic system to the market economy (1989-2005), are related to decollectivisation and privatisation. These changes are determining structural relocations of the different land use categories affecting rural development with direct impact on the quality of the environment.

The uncontrolled evolution of the Bucharest Metropolitan Area can be also analysed through *urban sprawl* (*sub-urbanization*). As a whole, urban expansion accompanies land fragmentation and land use diversification, improper waste management as well as high pressure upon water resources, agricultural land and biodiversity.

The paper analyses the effects of rural development and urban sprawl within Bucharest Metropolitan Area as well as the main environmental issues related to sub-urbanization process (land fragmentation, land abandonment, land market dynamics, uncontrolled waste deposits, water supply system, sewage system, gas supply system) with negative impact on metropolitan landscape.

ルーマニアは1990年代以来，科学的な視点から都心地域形成の概念を導入し，2000年代に入ってこれを行政的に採用した．1989年，共産主義体制が崩壊し，ルーマニアは大きな変革を遂げた．それは，土地利用・農業改革に始まり，市場経済への移行期(1989－2005)を経て，非集団化・私有化に関係した．土地利用変化は環境の質へ直接の影響をもたらした．ブカレストの都心部の非統制的発展は都市のスプロール化(副都心形成)を招いた．この論文では，これらについて，周辺農業地域の発展の影響，都市域におけるゴミ処理，上下水道システム，ガス供給システムなどを分析した結果を論じた．　（日本語要旨は漆原和子による）

Key words：metropolitan area, agriculture management, land use changes, urban sprawl, environmental issues

## Introduction

Socioeconomic transformation in Central and Eastern European states gave a start to a further phase of very intensive spatial development in towns and cities exerting high pressure upon the environment of the neighbouring areas because of the tendency to widen the residential space, by dint of resource consumption. This pressure creates a radical transformation of the terrestrial cover and land use, the environmental impact being differentiated according to the distance from the metropolis and certain axes of anthropic activity concentration.

Metropolitan area is an American term for a very large urban settlement or an extended urban area. The concept of MA was first given operational definition by the United States Bureau of the

Census in delimiting "*Metropolitan Districts*" in 1910. The term was changed to *Standard Metropolitan Area* in 1950, a concept based on the functional urbanized area, which became *Standard Metropolitan Area in 1960 (Goodal, 1987).*

At the beginning of the 90s the Europeans adopted a strategy for developing metropolitan zones, much later than the United States which, at that time, already had 250 metropolitan areas. In Europe there are 120 known metropolitan zones or areas of which 33 are now METREX (*European Metropolitan Areas and Zones Network*) members. Within the European Union there are 80 metropolitan areas.

In Romania, the initiative of developing and planning integrated metropolitan areas is encouraged by a favourable legislative environment starting with 2001. The first legislative measures regarding the *National Territory Management Plan, Section IV – Settlements (Law no. 351 of July 6th 2001),* defined metropolitan areas as *the zone (area) realized through association, by voluntary partnership between the main urban centres (the capital city of Romania and the first-rank municipalities) and adjoining the urban and rural settlements situated at distances up to 30 km, that established cooperation relations at different levels.* This law was added by other acts (*Law no. 350/2001, Ordinance no. 53/2002 and Law no. 286/2006*) coffering new approaches related to metropolitan organization and management.

According to the mentioned above acts, in Romania 16 cities intend to develop metropolitan areas (Figure 1). Among them, the Metropolitan Area of Bucharest is about to be created. Several variants have been proposed by now (*Bălteanu, Grigorescu, 2005*) and for this paper it is chosen the variant used by a joint scientific team of the Institute of Geography and the Urban Planning Centre (*Ianoş et. al., 1998-1999*). In this shape it extends to 467, 279 hectares with about 571,817 inhabitants, and its rural population covering 85% (485,692 inhabitants).

## Environmental issues related to agricultural practices

Due to its position in the Romanian Plain, Bucharest Metropolitan Area reflects the

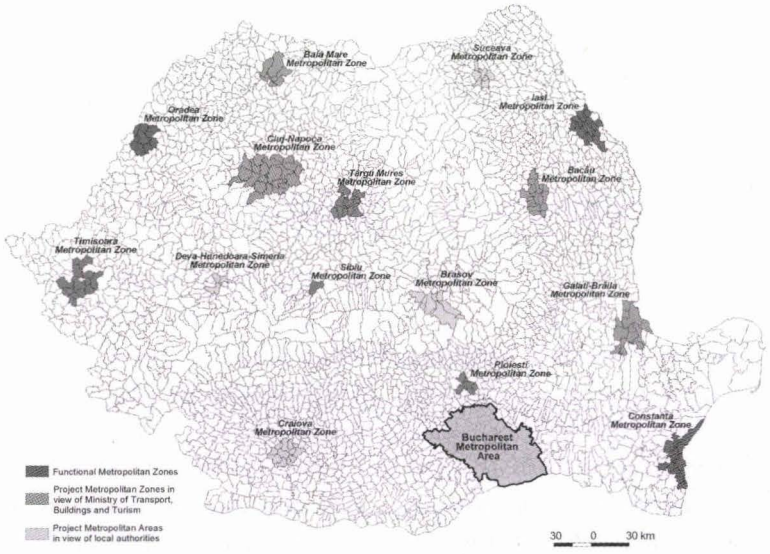


Fig. 1 Metropolitan development in Romania

environmental peculiarities of this relief unit. The Romanian Plain has always been an agricultural rural space because of its favourable geographic, social and historic circumstances characteristic of the space situated between the Carpathian Mountains and the Danube River, agriculture being its main function (*Geografia României, vol. V, 2005*).

According to the land use map (Figure 2), the agricultural land occupies most of the Metropolitan Area's territory and this explains its impact upon the environment as a result both of agricultural practices and policies that impose its differential management.

The agricultural activities put great pressure upon the environmental components and there are obvious effects to be identified for the biotic regeneration potential level, biologic diversity, environmental balance, resources, air, soil, potential buildings, and potential of the entertainment resources. The changes in agricultural land ownership have had an essential role in the pressure of agricultural activities and their impact upon the natural land and, then, upon the anthropic environment.

**The management of agricultural land during the transition period.** With the fall of the communist regime in the year 1989, Romania experienced radical changes in all fields of activity. A first branch to be seriously affected by the restructuring process was *agriculture*, due primarily to a fundamental change of property over the land, creating new means of approaching rural development. Unlike other former communist countries that have chosen to give the land back to its owners by offering certain financial stimuli and giving a new juridical status to the former state and collectivist ownership, Romania has focused upon the de-collectivization process (*Geografia României, vol. V, 2005*). The major changes in land use during the transition period from a centralised economic system to the market economy (1989-2007), are related to *decollectivisation and privatisation* of agriculture. These changes are determining structural relocations of the different land use categories affecting rural development with direct impact on the quality of the environment.

*Decollectivisation.* One of the first transition laws extremely important was *Law No 18/1991* also known as *The Land Law* and the additional lows (*169/1997, 1/2000*), which had in view to reconstitute the right to ownership of collective farm members, of their

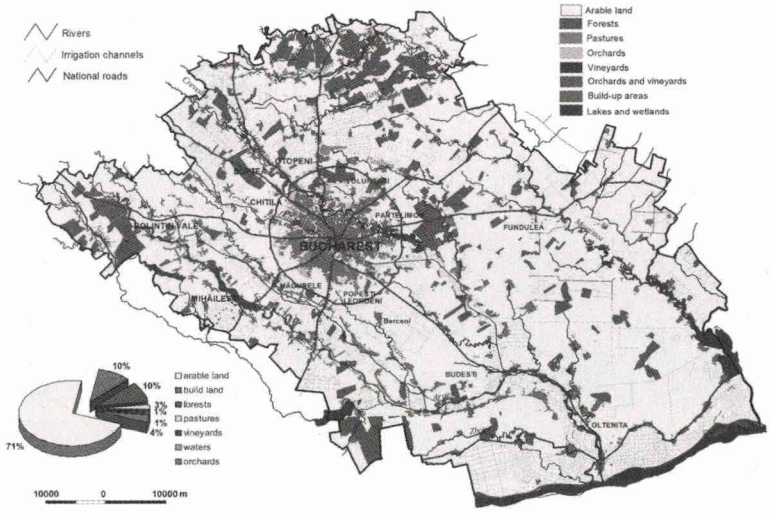


Fig. 2 The land use in Bucharest Metropolitan Area, 1989

successors and of other categories of persons.

*Privatisation* went hand in hand with decollectivisation, state-owned lands passing into the ownership of private economic agents. *Law no. 15/1990* and *Law no. 31/1990* are stipulating the reorganisation of state-owned economic units as autonomous companies and trading companies. The former state farms (IAS) were turned into trading companies with equity capital, enjoying a certain degree of autonomy, free from state plan constraints (*Laws no. 198/1999* and *no. 46/2000*). This process was accompanied by the destruction and the sales of the collective assets of the former Agricultural Production Cooperatives and State-owned Agricultural Farms.

Under the application of these measures and laws, new types of agricultural exploitations have appeared: the small and poorly equipped (individual or family) ***traditional peasant households*** (env. 2-3 hectares on an average); ***the agricultural businesses*** or ***trading companies*** (former State-owned Agricultural Farms) and the associative structures (family associations and agricultural companies with a juridical status).

The main effects of the enforcement of agricultural laws determined *land use changes* related to huge *land fragmentation, improper land management, land abandonment and abandonment of land betterment works*, especially the irrigation systems (Figures 3 and 4) with direct impact upon the quality of the environment.

Under the new transition conditions *land use management* has affected *land fragmentation* leading to an inappropriate way of managing agricultural land increasing the *plots density* especially in the case of individual properties where agricultural land use no longer brought any profit. In some situations the small plots of land are sold or when they have an attractive location they receive several other destinations (residential or entertainment use) as in Snagov, Mogoşoaia or Corbeanca Communes. This situation is aggravated by both peasants' lack of interest in tilling the land and the age structure of some communities with a high percentage of old people. Other effects of the agricultural practices are related to deforestation, soil erosion and pollution through agricultural pollutants.

## Environmental issues related to urban sprawl (sub-urbanization)

At the metropolitan level *van den Berg et al. 1982 and Petsimeris, 2003*, proposed the city cycle model in order to analyze the evolution of a single

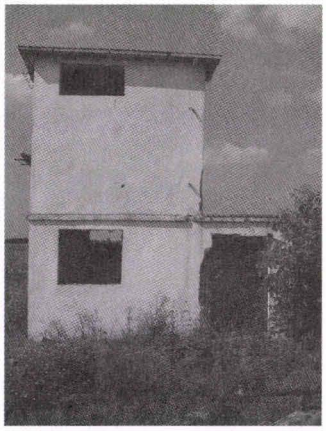

Fig. 3 and 4 Abandoned irrigation channel almost entirely covered with vegetation and abandoned final pump station, located at the end of an adduction channel (Frăsinet Commune, Călăraşi County)

functional urban region in time. According to this model there are four main stages in the life of a city: urbanization, sub-urbanization, de-urbanization, and re-urbanization.

***Urbanization*** is characterized by a rapid expansion of urban zones. This is the phase of industrial urbanization. This stage affected Bucharest Metropolitan Area during the communist period due to a forced urbanization process.

***Sub-urbanization*** is characterized by a strong process of deconcentration of both population and economic activities from the centre towards the hinterland that triggers a process of urban diffusion. This is considered to be the present-day evolution stage of Bucharest Metropolitan Area;

***De-urbanization*** is characterized by a decrease in population and employment, which affects the whole agglomeration. During this phase, small peri-urban centers register an increase in economic activities and population;

***Re-urbanization*** is characterized by the regeneration of the centre. In this phase there is a return to growth in the core, due to the rehabilitation or renewal of the historic centers.

The European de-concentration process and their effects on the environment can be evaluated according to the above-mentioned notions. For instance, territorial expansion models of Athens and Rome described a general model of development of the Southern European metropolis by linear tendencies of urban development along the main transportation axes as well as the appearance of residential zones outside these cites (*Petsimeris, 2003*). The astronomic land prices and the absence of housing programs have made many people move out to cheaper areas where there are no urban planning systems. This uncontrolled development has been followed by severe abuse and land speculation, sometimes accompanied by inadequate land use. These practices have been widely facilitated by laws that allowed land fragmentation into small plots without any previous zoning of the territory or control of the architecture of the new buildings.

After 1990, Bucharest Metropolitan Area witnessed the same spatial dynamics as mentioned above as a result of uncontrolled urban sprawl. The ***sub-urbanization*** process is typical for nowadays Bucharest evolution trends. With the fall of the communist regime in the year 1989 the structural relocations of the different land use categories affected spatial development (urban sprawl) with direct impact upon the quality of the environment.

Within the last ten years Bucharest Metropolitan Area experienced an increased urban sprawl mainly based on ***residential sprawl***. The main consequences related to urban residential sprawl within Bucharest Metropolitan Area are *land use changes and land/real-estate market dynamics*.

Before 1990, recent developed residential areas from the northern and north-western part of Bucharest (Pipera, Tunari, Corbeanca), had a dominant agricultural land use. Important surfaces of agricultural land use turned into other destinations: residential, commercial, public institutions, industrial use etc. - (Snagov commune: from 2000 to 2005, 1,000 ha become residential according to *Snagov Urban Plan, 2005*).

Another consequence related to urban residential sprawl is *land/real-estate market dynamics* (very expensive land, wealthy residents). The prices evolved from few eurocents/sqm to more then 100 euros/sqm on an average. Comparing to 2000, in 2006 land prices increased with about 25%-50%, in some cases even 200%. Ex: in Pipera-Tunari area, in the northern part of Bucharest, there is the most expensive land (1,000 euros/sqm), followed by Otopeni City (300 euros/sqm), Chitila City (200 euros/sqm) and Popeşti-Leordeni City (150 euros/sqm). Besides the traditional areas affected by sub-urbanization process with increased land prices, one can identify an incipient land market in some areas still unaffected by the sub-urbanization process such

as Bolintin Vale City, where in 2005 the land prices were in average 8 – 10 euros/sqm, rising up to more than 30 – 40 euros/sqm in 2007.

The residential use is emphasized through both individual and planned residential spread. The prices of these residential areas are mainly influenced by their geographical location (near green areas or waters) and by the proximity of main transport network with direct and rapid access to the capital city. Other aspects are related to the quality of the residential project (uniqueness, design) and to facilities access (guarding facilities, parking places, swimming pools, green areas, supermarkets, kindergartens, medical centres, leisure places), turning these residential projects into real luxury neighbourhoods. Through these new residential investments was made the transition from the individual resident houses (secondary, de week-end or holyday) with no proper environmental facilities, to compact residential areas, real "gated cities" with all the environmental facilities, reducing negative environmental impact (Figure 5).

Within Bucharest Metropolitan Area there were identified 6 compact residential areas (*Pipera-Tunari, Ştefăneşti, Mogoşoaia-Chitila, Corbenca-Otopeni-Baloteşti, Snagov-Periş, Pantelimon-Cernica-Brăneşti*) and 6 residential nuclei (*Dascălu, Buftea-Crevedia, Tărtăşeşti, Domneşti, Berceni, Comana*) in order to fallow the urbanization front extension from the traditional residential areas (north and north-west) to new developed residential areas (south and north-west) based on low land prices, attractive environmental features and transport infrastructure.

In most cases, the spatial extension of residential areas has not completely solved the access to environmental facilities (transport infrastructure, water supply system, gas supply system, sewage system) especially as far as the individual residential development is concerned. This is also the case of Pantelimon city, which become urban settlement in 2006, characterized by chaotic and uncontrolled build-up areas and unmodernized roads (Figures 6 and 7).

Another effect of sub-urbanization process in Bucharest Metropolitan Area is the absence or the insufficient access to public utility facilities, especially, in the new residential areas. Only 44

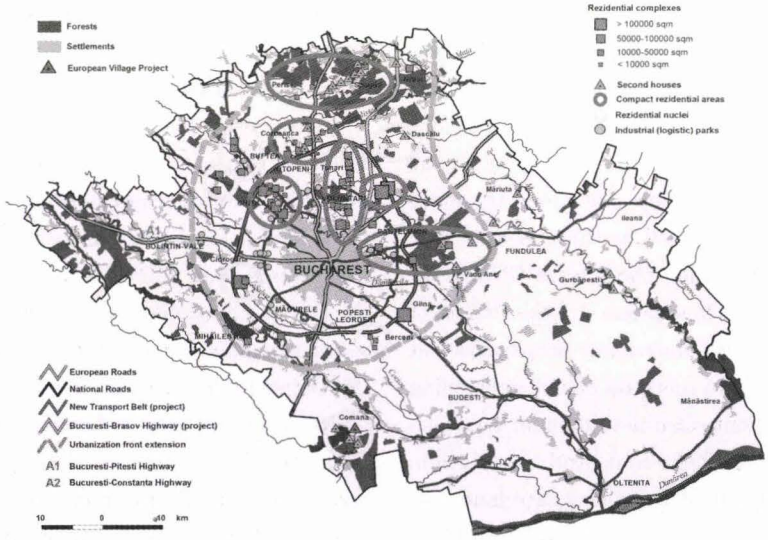


Fig. 5 Urban residential development in Bucharest Metropolitan Areas


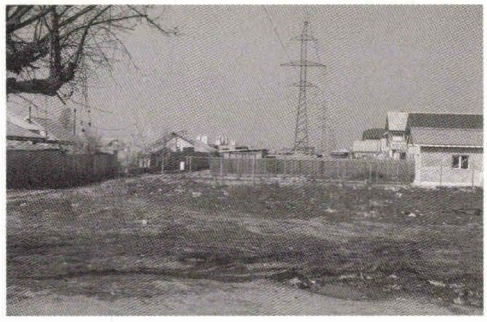

Fig. 6 and 7 Pantelimon City (Ilfov County) – unmodernized roads
(August 2005 and March 2007, respective)

Table 1 The water supply system within Bucharest Metropolitan Area

| County | Localities with centralized water supply system | |
|---|---|---|
| | from local budget | from European founds |
| **Călăraşi** | Oltenița, Budeşti, Căscioarele, Ulmeni, Spanțov, Chiselet, Mânăstirea, Valea Argovei, Luica, Ileana, Fundeni | Grădiştea, Săruleşti (Săruleşti-Gară and Sănduliţa villages); Valea Argovei (expansion) Spanțov (modernization); Mitreni (Mitreni and Valea Roşie villages); Frăsinet (Frăsinet village) |
| **Dâmboviţa** | Crevedia, Tărtăşeşi | Ulmi |
| **Giurgiu** | Comana | |
| **Ilfov** | Bragadiru, Chiajna, Chitila, Jilava, Măgurele, Mogoşoaia, Pantelimon, Baloteşti, Brăneşti, Cernica, Ciolpani, Ciorogârla, Corbeanca, Cornetu, Dascălu, 1 Decembrie, Grădiştea, Gruiu, Moara Vlăsiei, Nuci, Periş, Petrăchioaia, Snagov, Ştefăneştii de Jos. | |

*Source: Pilot study of the Bucharest Metropolitan Zone Mangement Plan, 2005 and SAPARD Report, 2006*

Table 2 The sewage system in Bucharest Metropolitan Area

| Judeţul | Localities with sewage system | |
|---|---|---|
| | from local budget | from European founds |
| **Ilfov** | Bragadiru, Chitila, Buftea, Jilava, Măgurele, Pantelimon, Popeşti-Leordeni, Baloteşti, Brăneşti, Corbeanca, Cornetu, 1 Decembrie, Gruiu, Moara Vlăsiei, Periş, Petrăchioaia, Snagov, Ştefăneştii de Jos, Voluntari | Chitila (extension), Snagov (Ghermăneşti village-modernization), Chiajna |
| **Călăraşi** | Oltenița, Budeşti, Mânăstirea | |
| **Giurgiu** | Bolintin-Vale | |

*Source: Pilot study of the Bucharest Metropolitan Zone Mangement Plan, 2005 and SAPARD Report, 2006*

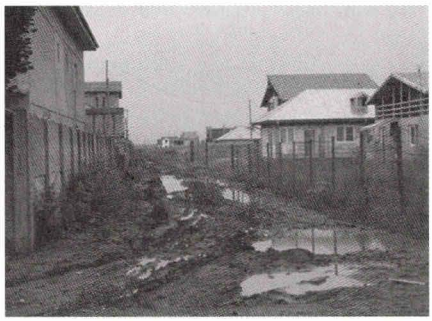
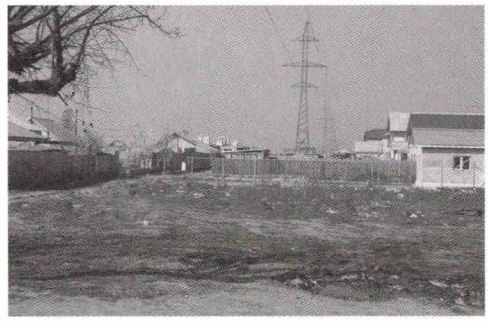

Fig. 8 and 9 Watershed affected by wastewater discharge
(Scoiceni Channel and Pasărea River, respectively)

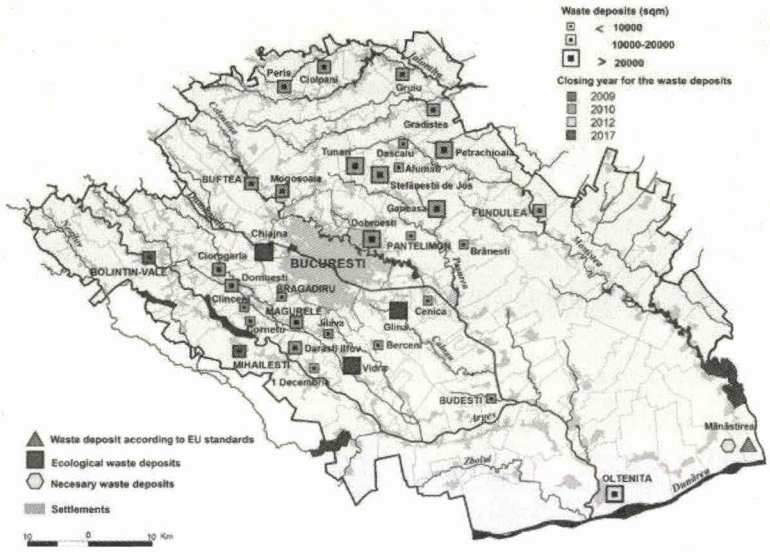


Fig. 10 Waste deposits in Bucharest Metropolitan Area, after Waste Management Regional Plan, Bucureşti-Ilfov and South-Muntenia Development Regions 2006-2013

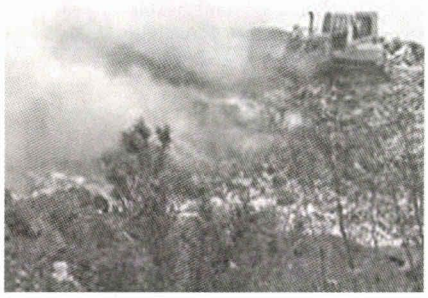

Fig. 11 Fire affected an unprotected cesspool from Rudeni village, Ilfov village (6th May 2007)

out of the 94 settlements have a centralised ***water supply system***, while the other localities got their water from the phreatic layer by means of village fountains (Table 1). In many localities water supply system is inadequate as there are big water losses in the distribution network.

Most of the localities in the Bucharest Metropolitan Area do not have any ***sewage network*** or water purification systems. Only 24 settlements (out of the total 94) are connected to a sewerage network (Table 2) and only 7 of them have water purification plants (Glina, Buftea, Gruiu,

Fig. 12 and 13 Uncontrolled waste deposits in Pasărea riverbed (March 2007) and household waste randomly thrown in Valea Dragului Commune, Giurgiu County (August, 2006)

Corbeanca, Bolintin Vale, Oltenița, Budești). Even where it exists, the sewage system did not function adequately.

In many localities, wastewaters flows directly into the river or lake network, without any adequate purification representing a major environmental threat (Figures 8 and 9).

Other environmental issue within Bucharest Metropolitan Area in terms of sub-urbanization process is related to ***gas supply system***. The use of wood and coal heating in most individual households has favoured abusive deforestation with negative effects upon the quality of the environment. In most of the settlements which have gas supply systems the physical and the moral wear of the central heating equipment prevent it from ensuring adequate heating and cause the pollution of the phreatic layer and of the soil (e.g. in Bolintin-Vale, Mihăilești and Niculești).

The major changes in land use during the transition period determined an improper landscape management, a great number of polluted industrial sites unused or partly used, uncontrolled spread of individual houses without environmental facilities causing, in most of the cases, problems related to ***waste management***.

Within Bucharest Metropolitan Area there are 3 ecological waste deposits and 34 small waste deposits managed at local authority's level (29 in Ilfov County; 3 Călărași County and 2 in Giurgiu County) with surfaces from 5,000 sqm (Clinceni, Jilava, Cernica) to 55,000 sqm (Oltenița), totalising 461,000 sqm. According to EU standards, these local waste deposits will be closed by 2017 (Figure 10).

Although there are 3 ecological waste deposits of regional importance and 34 waste deposits of local importance, the uncontrolled waste deposits is an important environmental issue for Bucharest Metropolitan Area. Even near Rudeni Ecological Waste Deposit the house waste is chaotically spread all around the deposit and in other unprotected cesspool. The residents claim that during summer time are affected by the unpleasant smell and the toxic smog due to fires that occur weekly (Figure 11).

Most of the waste cesspools are inadequate, unauthorized or incompatible with the UE demands and standards. House waste is chaotically spread nearby settlements, forests, water bodies (as a source of drinking water) and agricultural land (Figures 12 and 13).

The illegal waste deposits and their improper exploitation could determine a major impact on the environment on a long term through: soil degradation; air pollution by a high level of dioxins, furans and acids which could affect peoples health and reduce development of different species; underground water contamination with heavy metals, nitrates, nitrites, acids, organic substances; flora and fauna contamination; biodiversity and habitats losses; important fire sources etc.

## Conclusions

The increased urban sprawl which has been affecting the Romanian territory over the last period, especially through the development of metropolitan areas represents the main characteristic of today's urban evolution trends. The main directions of environmental impact in Bucharest Metropolitan area are related to ***agricultural development*** (agricultural practices and agricultural management through lows and administrative measures) and ***urban sprawl*** (sub-urbanization process).

The environmental impact of the metropolitan development of Bucharest Municipality causes: ***spatial relocations*** through *land use changes, land fragmentation, land abandonment, etc.*; ***space consume (spatial expansion)*** with a great impact on agro-forestry ecosystems through different environmental changes (deforestations, drills, etc.) and the ratio population/habitat by: *residential*

*sprawl* (circular - around the capital city and radial – along the main routes) and *new industrial areas (industrial or logistic parks)* by grouping banking, real-estate, ensuring companies; ***uncontrolled natural resources exploitation; environment pollution*** as a result of solid waste diversification, waste waters discharge in river bodies, lack of water supply system and gas supply system, industrial units which do not respond to European Union demands etc.; ***damaging the population health status*** by increasing the number of ill persons (cardiac, lung diseases, etc) and ***increasing the incidence of climatic extreme events*** (rainfall, storms, heat waves, etc).

The present way of managing space in Bucharest Metropolitan Area features an increase of conflicts between the socio-economic development on the one hand and the environmental protection according to the requirements of sustainable development on the other hand. It appears that the biggest threat to the sustainable metropolitan development is related to the increasing suburban pressure upon the areas surrounding the Bucharest Municipality leading to the diversification of land use and environmental impact categories, having complex and diverse effects upon the environment.

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